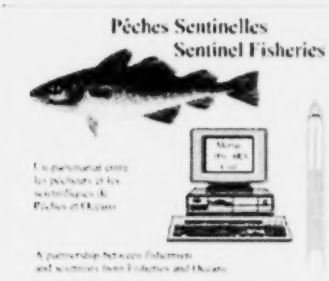

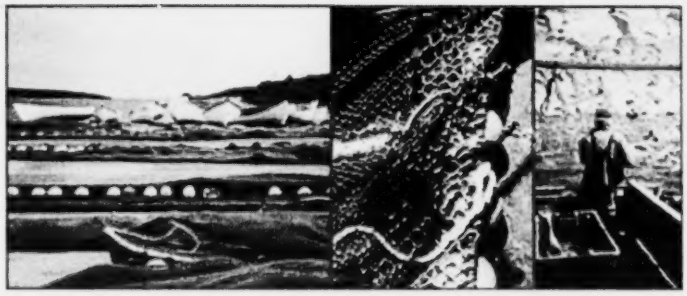

Preliminary Report on the July 2006 Mobile Sentinel Survey in the Northern Gulf of St. Lawrence

November 2006

Sentinel Fisheries Program

Each year, biologists from Fisheries and Oceans assess the status of commercially exploited fish and invertebrate stocks. In order to perform these evaluations, scientists use data provided, in part, by mobile gear sentinel fishers (trawlers). The surveys performed by the mobile sentinel fishers cover almost the entire northern Gulf of St. Lawrence. Once analysed, the collected data are used to calculate abundance indices that are used to estimate the status of various stocks.

The mobile gear Sentinel Fisheries Program follows a depth-stratified random survey plan. The northern Gulf is divided into depth strata because depth is known to have an influence on the distribution of fish and invertebrate species. The following strata have been defined: 10-20, 20-50, 50-100, 100-150, 150-200 and over 200 fathoms (1 fathom = 1.83 metres = 6 feet). The mobile survey consists of 300 stations randomly selected within those strata. All strata are sampled because results from this survey are used for many species that have different depth preferences. It is also important to find the limits of distribution of a specie and to monitor any potential shifts in time . Nine trawlers, five from Newfoundland and four from Quebec perform the entire survey. At each predetermined station, the vessel performs a standard 30 minutes tow at 2,5 knots. The nine boats participating in the survey use the same trawl, a 300 Star Balloon mounted on a Rock Hopper footgear. The trawl mesh size is 145 mm with a liner of 40 mm in the codend. The use of a liner allows the sampling of fish as young as age 2 for cod but also requires the presence of an observer or a trained technician aboard each vessel. The observers are from Biorex in Quebec and Seawacth in Newfoundland. In spite of the fact that all nine boats use the same trawl, a study showed a 25% variability in wing spread opening during trawling activities. The use of a restrictor cable allows to reduce this variability to 6 % and thus to compare the catches from all vessels.

The sentinel surveys require a great deal of thoroughness in collecting a variety of data. With the help of the crewmembers, the observers or the technicians are responsible for the collection of numerous data according to a scientific protocol. At each set, the total catch is sorted by species and weighed. Then the length, weight, sex, and maturity of a number of fish of each species are recorded. For specific demands, some samples (otoliths, liver, gonads, stomach etc.) may also be taken on some fish. Moreover, fish samples are collected and frozen for diverse studies (e.g. growth determination on turbot, genetic study on redfish). Finally, water temperature and fishing depth data are collected using a Vemco sensor installed on the trawl. These biological and oceanographic data yiel d valuable information on the size, growth, condition and diet of various species, as well as stock abundance and water temperature.

The Department of Fisheries and Oceans (DFO) has primary responsibility for the administration of the sentinel program. The implementation of the program is the responsibility of the Association des Capitaines-Propriétaires de la Gaspésie inc. (ACPG) for mobile gear fisheries in 4S and 4T Divisions, and of the Fish, Food and Allied Workers (FFAW) of Newfoundland in 3Pn and 4R Divisions.

Between 1995 and 2002, two mobile surveys were carried out annually. These fishing activities, each lasting about two weeks, were conducted in July and October. Since 2003, only the July survey is done every year due to rationalisation and cuts of 34% in the sentinel program budget,.

July 2006 Survey

The 12th annual July sentinel survey was conducted in the northern Gulf of St. Lawrence between July 2 and July 17, 2006. A total of 295 fishing stations were successfully carried out (Figure 1), i.e. 21 in 3Pn, 129 in 4R (including 10 tows in the 10 to 20 fathoms strata), 115 in 4S and 30 in 4T. Those 295 stations represent 98% of the sampling target.

- From July 3 to July 17, four Quebec trawlers sampling 4ST completed 145 out of a planned 150 stations (Figure 1). On the west coast of Newfoundland (3Pn, 4R), from July 2 to July 6, five trawlers carried out the entire 150 planned stations (Figure 1).

- The 30 tows in the 4T Division are conducted to complement the assessment of the Unit 1 redfish and the Greenland halibut (turbot) stocks for the management unit 4RST. **The cod catches in 4T are not used to estimate the abundance of the northern Gulf of St-Lawrence cod stock (3Pn, 4RS)** .

- Catches from the 10 tows carried out in the three coastal strata in 4R (10 - 20 fathoms) were used to calculate an index of minimum trawlable biomass for cod. However, those strata having been surveyed only in the last four years (2003 to 2006), the treatment of this new index will be determined in the upcoming cod assessment in winter 2007.

- Cod, redfish and turbot catches for the 295 successful tows of the 2006 July survey are presented in table 1. This table also shows the total catches in cluding the unsuccessful and the discretionary tows. In 2006, the fish composing the main proportion of the other species category are American plaice, capelin, Atlantic halibut, herring, thorny skate, longfin hake, witch flounder, and white hake .

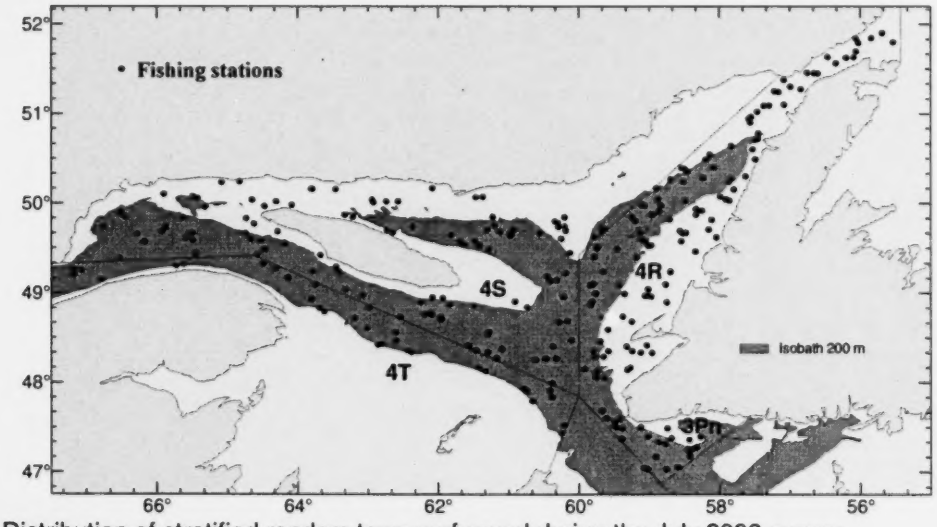

Figure 1: Distribution of stratified random tows performed during the July 2006 survey.

Table 1: Cod, redfish, and turbot catches for the successful tows and total catches including unsuccessful and discretionary tows for the July 1995-2006 surveys (3Pn, 4RST).

	Sets		Survey Catches (kg)			Total Catches (kg)			
Year	Survey	Total	Cod	Redfish	Turbot	Cod	Redfish	Turbot	Other Species
1995	311	326	6 477	11 457	649	6 598	1 . 662	675	4 799
1996	272	332	7 254	16 921	1 300	12 108	27 169	1 502	8 743
1997	285	313	8 642	12 358	1 206	11 271	13 582	1 397	5 928
1998	289	320	7 719	16 154	1 472	12 196	36 231	1 668	7 311
1999	294	335	5 487	12 623	1 703	19 396	17 177	2 079	4 160
2000	291	324	7 893	7 574	1 583	16 963	10 486	1 932	5 580
2001	275	317	10 238	7 603	1 342	16 476	14 421	1 814	4 402
2002	261	293	7 729	8 101	1 486	18 551	8 849	3 090	4 315
2003	296	326	13 741	6 400	1 693	14 040	6 616	3 512	3 663
2004	280	317	14 072	8 245	2 015	15 655	13 295	2 567	6 941
2005	285	303	9 662	6 785	2 977	10 023	7 802	3 649	9 054
2006	295	325	13 174	5 106	2 748	15 332	5 963	3 624	7 224

1. ***Biomass and Distribution of Groundfish***

Cod

The July sentinel survey series (1995-2006) suggest an increase in the minimum trawlable biomass index for cod between 1995 and 2000 with a rather stable period after. The preliminary data for 2006 indicate that the minimum trawlable biomass index is similar to that of 2004 with 91,657 tonnes (Figure 2a).

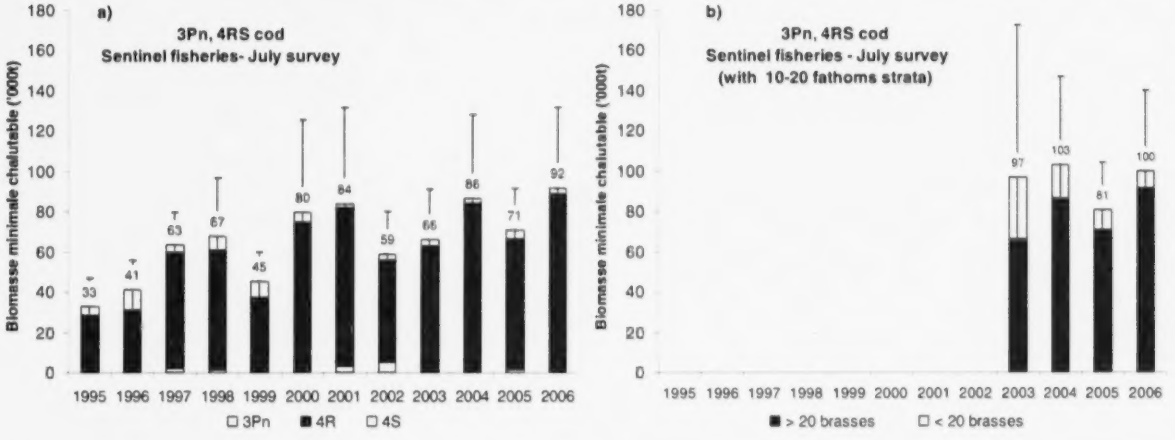

Figure 2: Minimum trawlable biomass index for cod based on the stratified random tows of the July sentinel mobile survey in 3Pn and 4RS Divisions (1995 – 2006). a) For strata of depth greater or equal to 20 fathoms b) Including the three strata in 10-20 fathoms.

The minimum trawlable biomass index shows a decrease between 2005 and 2006 for the 3Pn and 4S Divisions. On the opposite, the 4R Division increases with the minimum trawlable biomass going from 65,486 tonnes in 2005 to 88,218 tonnes in 2006.

Since 2003, three inshore strata between 10 and 20 fathoms were sampled in the 4R Division. The purpose of these strata was to look at the presence of cod outside the zone previously sampled by trawlers in the July mobile gear sentinel survey. The localisation of the strata are as follows: one on each side of the strait of Belle Isle; one, north of the 49 th parallel; and another south of the 49 th parallel. Ten tows were done in these strata by three trawlers during the July 2006 survey (Figure 3). The cod catches varied between 0 and 257 kg for a 30-minutes standard tow. Seven of the ten tows reached the 30 minutes duration while the other three lasted less than 30 minutes, either because of bad bottom (trawl hooked at the bottom) or because of the presence of fixed gears. This year, the minimum trawlable biomass for those three strata is the lowest of the short series, going from 33,640 tonnes in 2003 to 8,480 tonnes in 2006 (Figure 2b). The estimate of total minimum trawlable biomass including the 10 to 20 fathoms strata indicates an increase between 2005 and 2006. The value for 2006 is similar to 2003 and 2004.

As in the past, the cod concentrations remain very low in Division 4S (Figure 3). Moreover, the amounts of cod as determined by the mobile sentinel surveys are much lower in 4S and 3Pn compared to 4R. The catch distribution shows that cod is located primarily in Division 4R along the west coast of Newfoundland (Figure 3). Of the 295 tows performed in this survey, 6 had catches of cod of more than 400 kg. Of those 6, 5 were localised near the entry or in the strait of Belle Isle.

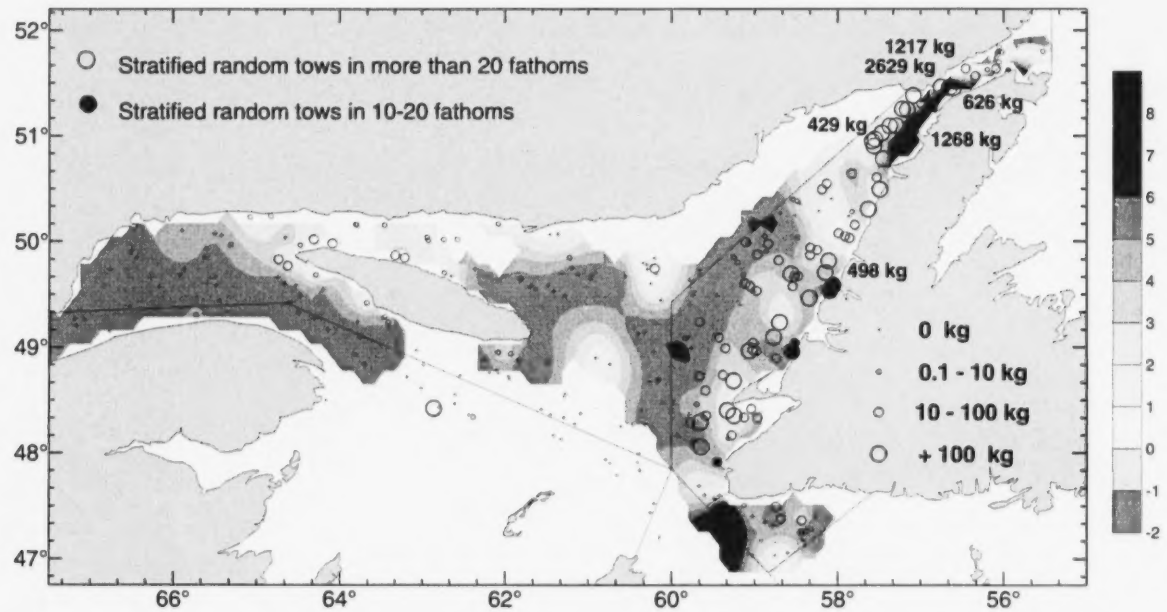

Figure 3: Bottom temperature and observed catch rate (kg / standard tow) distribution of cod for the July 2006 stratified random survey in 3Pn and 4RST Divisions. Catches greater then 400 kg are identified on the map.

Redfish

For the Unit 1 redfish stock (4RST Divisions), the July sentinel survey series (1995-2006) indicate a higher minimum biomass index between 1996 and 1999. In 2001, there is a decrease in the minimum trawlable biomass index with an estimate comparable to 1995. From 2001 on, the index is relatively stable. The 2006 estimate of biomass is the lowest of the series with 37,398 tonnes (figure 4).
As in earlier years, the redfish was concentrated for the most part in the channels of the Northern region of the Gulf (Figure 5). In July, good concentrations of redfish were found in the 3Pn subdivision. This area is not part of the redfish stock of Unit 1 management (4RST) between the months of June to December.

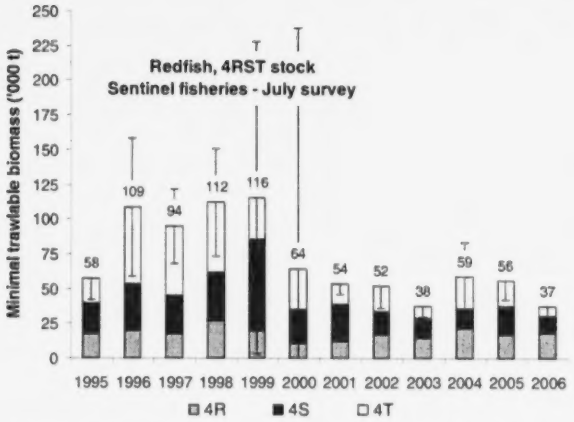

Figure 4: Minimum trawlable biomass index for redfish in 4RST based on the July stratified random survey (1995 – 2006).

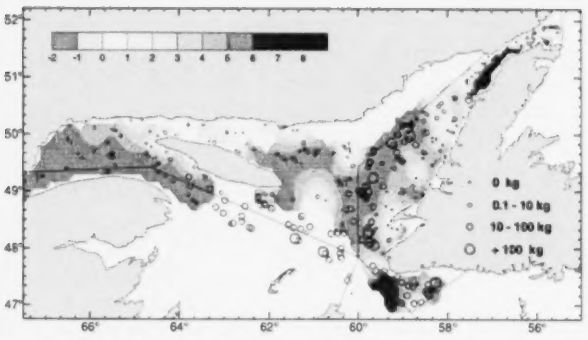

Figure 5: Bottom temperature and catch rate (kg / standard tow) distribution of redfish for the July 2006 stratified random survey in 3Pn and 4RST.

Greenland Halibut (turbot)

For the Gulf of St. Lawrence turbot stock (4RST Divisions), the July sentinel survey series (1995 – 2006) shows a general increase in biomass. The 2006 estimate is lower than in 2005 with an estimate of 33,396 tonnes (Figure 6). This decrease is observed in the 4T Division. The 2006 biomass estimate is the second highest of the series.

The turbot was concentrated mostly in the Estuary and in the Laurentian Channel, around Anticosti Island and in the Northern portion of the Esquiman Channel (Figure 7). The distribution of Greenland halibut is overall similar to those of earlier years. The mobile sentinel survey does not sample the Estuary where turbot is found in abundance in the August DFO's annual scientific survey and in the commercial fishery.

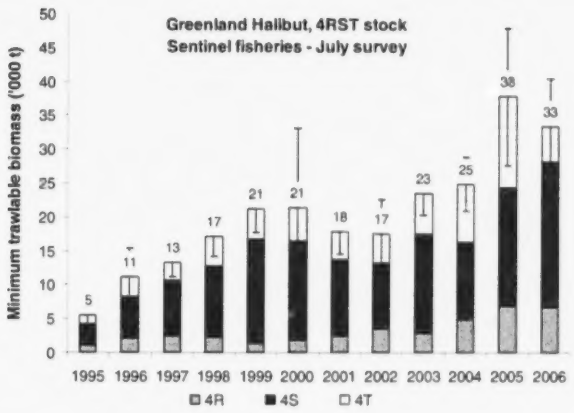

Figure 6: Minimum trawlable biomass index for Greenland halibut based on the July stratified random survey (1995–2006).

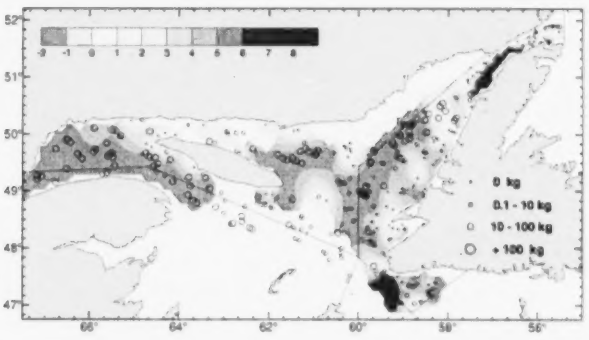

Figure 7: Bottom temperature and catch rate (kg/standard tow) distribution of Greenland halibut for the July 2006 stratified random survey in area 3Pn, 4RST.

2. Sampling and Analysis

The catches were sorted by species, weighted and or counted .The sampling of biological data (length, sex and weight) was completed for cod, redfish, Greenland halibut, and Atlantic halibut.

Otoliths

Otoliths were taken from cod in area 3Pn, 4RS. The otoliths are used to determine the age of individual specimens and these data will be included in the next cod stock assessment to be held in winter 2007. Age is one of the key parameter in the study of fish population dynamics and in the evaluation of the abundance for the northern cod of St. Lawrence (3Pn, 4RS). The abundance is actually assessed with a model that has age-structured data as input. Such models allow a better follow up of the evolution of the stock dynamic.

Stomach

Cod and Atlantic halibut stomachs were collected to study the fish diet. The frozen samples were sent to the Maurice Lamontagne Institute where Denis Chabot's group will analyse the stomach content.

Witch Flounder

Witch flounder are typically found in deeper waters of the North Atlantic. The assessment of the resource relies on analyses based on length. The length frequencies per sex were collected for the assessment of the witch flounder. Douglas Swain of the Gulf Fisheries Center in Moncton (DFO) is the scientist responsible for the stock assessment of the witch flounder in the Gulf.

Turbot

Specimens of small turbot (< 325 mm) were collected, frozen and sent to the Maurice Lamontagne Institute for a project realised by Yvan Lambert on the determination of growth of juvenile turbot.

Redfish

Small redfish (< 15 cm) were collected in the 3Pn NAFO Division. Jean-Marie Sévigny' s group, in Mont-Joli will perform genetic analyses on these fish to determine the species.

Acknowledgements

We wish to acknowledge the dedicated work of all the skippers, crewmembers, observers, technicians, and coordinators who contributed in reaching the objectives of the 12 th annual July sentinel survey.

Table 2. List of the skippers (*boat name*), crewmembers, technicians and observers (company) who contributed to the July 2006 sentinel survey:

4R, 3Pn			4S		
Skipper	Crew	Observer	Skipper	Crew	Observer
Winsor Hedderson (*Northern Tip*)	Leonard Warren Enos Gaulton Emphrim Smith	James Marsden (Seawatch)	Jean-Pierre Élément (*Rémy Martin*)	Rémy Élément Martin Élément	André Gagnon (Biorex)
Garfield Warren (*885-77*)	Dereck Pittman Anthony Pilgrim Martin Larkin	Monty Way (FFAW)	Albert English (*Annie Annick*)	Robert Dumaresq Steeve Chouinard	Marie-Hélène Baril (Biorex)
Dereck Coles (*Catalina Venture*)	Robert Campbell Gorvin Williams Ashley Coles	Jason Spingle (FFAW)	Marcel Roy (*Sextan*)	Gildas Cotton Jean-Guy Côté Mathieu Roy	André Turcotte (Biorex)
Murray Lavers (*Sylvia Lynn II*)	Floyd Biggin Warren House Barry Ryan George Plowman	Loomis Way (FFAW)	Réjean Bernatchez (*Chlorydon*)	Paul-René Côté Gilles Côté	Diane Darveau (Biorex)
Dan Genge Jr. (*NFLD Storm*)	Claude Genge Jr. Kevin Genge Genna Genge Whyman White	Levi Harvey (Seawatch)			

For more information:

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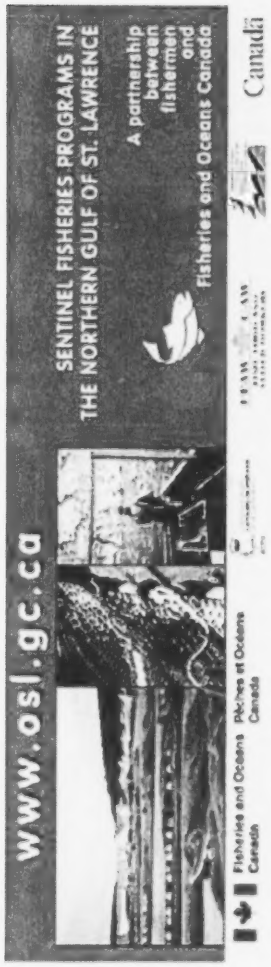
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